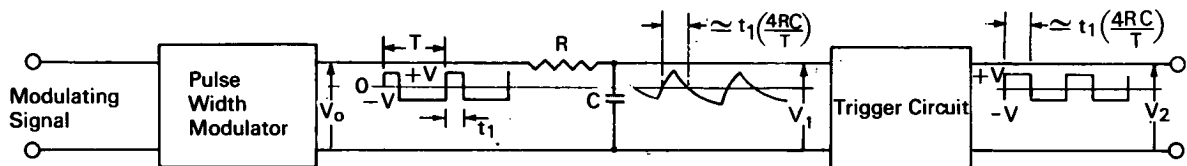


NASA TECH BRIEF



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Circuit Multiplies Pulse Width Modulation, Exhibits Linear Transfer Function



The problem:

To provide a simple means of multiplying the width modulation of a pulse train by some constant factor.

The solution:

A modulation multiplier that operates directly on a pulse width modulated input signal to generate an output pulse train having a greater degree of width modulation than the input signal.

How it's done:

Pulses from the pulse width modulator are applied to the input of the modulation multiplier. The modulation multiplier consists of an RC low-pass filter followed by a level-sensing trigger circuit. This circuit responds to its exponential sawtooth input voltage V_1 by switching to output level $+V$ when V_1 is positive and to $-V$ when V_1 is negative. In this way the circuit generates the pulse width modulated output V_2 . When the RC time constant is equal to or greater than the period T of the pulses V_0 (the input to the modulation multiplier), the multiplication is linear (within 2 percent for RC equal to the input pulse period and better as the RC time constant increases) over the whole range of operation. The output modulation is greater than the input modulation by approximately $4RC/T$.

Notes:

1. The modulation multiplication method also applies to input pulse switching between $+V_0$ and 0 volts. However, the level at which the trigger circuit changes state must be adjusted to compensate for the additional dc level of the input pulse.
2. Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Headquarters
National Aeronautics and Space Administration
Washington, D.C. 20546
Reference: B67-10055

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: A. W. Carlson and A. Furciniti
of Northeastern University
under contract to
Headquarters, NASA

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Category 01